Commercialization: Implementing INL Innovations

“One of the major commitments that Battelle Energy Alliance has made to the operation of the Idaho National Laboratory is to support and aggressively pursue the commercialization of technology coming out of the R&D programs,” said Laboratory Director John Grossenbacher. “The INL has been pursuing technology commercialization for a number of years and several of those efforts are now having significant commercial impact. This video highlights the NanoSteel company and NitroCision, two companies built around licenses of INL patents. Both firms have achieved success within their respective industries, growing in the Idaho community and creating impact on the national stage.”

The NanoSteel Company was established in 2002 to commercialize high-performance materials developed by Dr. Daniel Branagan during his career as an INL researcher. In 2005, NanoSteel achieved annual sales in excess of a million dollars and secured a third round of financing that will enable the company to respond to exponential growth in the demand for NanoSteel products. The research efforts are headquartered in Idaho Falls, Idaho. NanoSteel continues to be a technology partner with INL. This is a prime example of a successful spinoff from a national lab. The NanoSteel Company develops, manufactures and supplies super-hard steel for industrial use in applications for abrasion, wear and corrosion are of concern. The patented process was researched and developed by Dr. Daniel Branagan while working at the INL. NanoSteel, a tech transfer company, develops and markets new alloys, that when applied as a coating to steel, have a unique combination of hardness, toughness, ductility and corrosion resistance. The NanoSteel team of research scientists and metallurgists concentrate on nano technology to form super-hard alloys. The application process has a rapid solidification, which forms a metallic glass. When applied to metallic surfaces, the glass that is formed withstands wear and is corrosion-resistant.

“There are two distinct visions of materials nano technology,” said Branagan. “One of these is called the Feynman vision, which is really a futuristic vision focused on program assemblies, replicators and swarms of nano machines acting in unison. But our vision at the NanoSteel Company is a little bit different. We’re focused on solving problems today. We’re focused on the mainstream of society, so we’re trying to solve issues related to the automobile, the mining crusher, and the bulldozer. And, what we have developed is a rapid alloy design and commercialization approach where we can very quickly take basic discoveries in the laboratory and go directly to large-scale commercial production.”

The NanoSteel process makes steel stronger and super light. These new properties, combined with the advanced wear capabilities, make this product commercially attractive to a wide range of applications. Currently, NanoSteel is delivering super-hard steel in a thermal spray powder and a cord welding wire. NanoSteel is being used by Grant Prideco, the world's leader in drill stem technology and drill pipe manufacturing; Praxair TAFA, a Fortune 500 industrial gas producer and world leader in thermal spray technology; and Integrated Global Systems, a leading applicator serving power generation. In a world that is always in motion, NanoSteel can provide economical solutions that can reduce wear on moving parts and engines, motors or aircraft landing gear. The increased life of metal parts is a cost savings to the producer and to the consumer, and is environmentally friendly. From the depths of the ocean to aerospace, medical or environmental, transportation and recreation . . . . NanoSteel.

NitroCision , located in Idaho Falls, Idaho, was formed in 2001. Since its beginning, it has been a key player in the exploitation of the INL ZAWCAD technology. The Idaho National Laboratory began the research and development of ultrahigh-pressure liquid nitrogen at cryogenic temperatures in 1982. It was to be used in opening stored waste containers, with the aid of the INL technology transfer. NitroCision was awarded the exclusive license to commercialize this advanced technology in 2001. This patented process of cryogenic cutting was recognized in 1999 by R&D Magazine as one of the 100 most technologically significant new products of the year.

In 2003, NitroCision introduced the NitroJet system for commercial and industrial applications. This revolutionary method of cutting or cleaning is possible because of the patented method of cooling and pressurizing liquid nitrogen. The nitrogen is delivered through nozzles developed though NitroCision to create an ultrahigh jet stream. Pressure at the nozzle can be as high as 55,000 PSI and temperatures as low as – 235 F. Other systems used for cutting and cleaning use chemicals, water, beads and shells. The NitroJet use of liquid nitrogen delivers a completely dry method of cutting or cleaning that gives results much like ultrahigh-pressure water, but without the negative residual contaminated water to collect and process. The water- or chemical-based methods often create larger problems than they solve. NitroJet is clean; it can be used in heat sensitive materials because it eliminates the introduction of heat. Nitrogen is chemically inert. It is environmentally friendly. The liquid nitrogen returns to the atmosphere as a gas. NitroJet removes layers of paint, cleans heat exchanges from the mining industry, it cleans chemical coatings in the microchip manufacturing process. It is effective in the removal of radioactive contamination without using water or chemicals. NitroJet cuts fabrics or food, removes rust and corrosion. This clean technology has been used by the U.S. military and NASA.

In 2005, NitroCision was presented the NASA space flight awareness award. NitroCision's technology improves the world where we live and explores our future. NitroCision . . . . beats the alternative, cold.